

CLAIMS

1. A mobile data wireless relay device, the device having:
receiving means for receiving payload data from a data source,
5 a buffer for storing payload data for subsequent transmission,
means for receiving status data from similar devices,
status data generation means for generating status data, the status data being
derived from the quantity of data in the buffer store and the status data received from
other devices, and comprising data relating to
10 the position of the device,
the quantity of data in the buffer store
a scalar forwarding value and
a forwarding direction,
status transmitter means for transmitting status data to other devices
15 selection means for identifying from the status data a receiving device to which
the payload data is to be forwarded, the receiving device being located in a position
indicated by the forwarding direction,
payload transmission means for transmitting the payload data to the receiving
device.
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2. A mobile data wireless relay device according to claim 1, comprising means for
receiving payload data transmitted by other similar devices.
3. A mobile data wireless relay device according to claim 1 or claim 2, further
25 comprising a data source
4. A mobile data wireless relay device according to any preceding claim, wherein
the selection means is arranged to only identify a suitable receiving device if the scalar
forwarding value meets a threshold criterion.
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5. A mobile data wireless relay device according to any preceding claim, further
comprising condition-monitoring means for monitoring the expected lifetime of the device,
and adjusting the scalar forwarding value accordingly.
6. A mobile data wireless relay device according to any preceding claim, comprising
35 means for defining a first node and a second node, the nodes being spaced apart by a

distance determined by the amount of data stored in the buffer, the first node being assigned a positive value for an attribute q and the second node being assigned a negative value for the attribute q , equal in magnitude to that assigned to the positive node,

the wireless relay device has means for receiving data broadcast by similar
5 wireless relay devices identifying the position data and attribute values of nodes defined by the similar wireless relay devices,

means for generating position values for the first and second nodes based on the attribute values of its own nodes and the positions and attribute values of the nodes defined by the neighbouring devices,

10 means for transmitting the position data and attribute values to similar wireless relay devices

means for transmitting payload data to devices that are in the general direction of the second node.

15 7. A mobile data wireless relay device according to any preceding claim, wherein the positions of the first and second nodes are determined by determining the position in which the aggregate value of the products of the attribute values of each node with each node of one or more neighbouring devices, and an arithmetical function of the distance between them, is a minimum or maximum.

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8. A network of wireless relay devices comprising a plurality of mobile wireless relay devices capable of receiving payload data, and each having means for identifying a forwarding direction relative to itself, and means for transmitting data to another of the devices whose current position is in the said forwarding direction and within a
25 predetermined distance, wherein the devices co-operate to define their forwarding directions such that payload data is transmitted to a target sink device by means of one or more of the wireless relay devices.

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9. A network of wireless relay devices according to claim 8, wherein each device defines a positive receive node and a negative transmit node, spaced a predetermined distance apart, and the devices co-operate to define the positions of the nodes so as to minimise the aggregate distances between nodes having opposite signs, and wherein the

forwarding direction of each device is defined as the direction from its receive node in which its transmit node lies.

10. A method of operating a plurality of mobile data wireless relay devices,
5 comprising:

collecting data in buffer stores in one or more such devices,
exchanging status data between the devices, the status data comprising data
relating to

- the positions of the devices,
10 the quantity of data in their buffer stores
each device defining, from the status data, a forwarding direction towards which
the payload data in its buffer store is to be forwarded,
transmitting the stored payload data to a device located in the forwarding
direction.

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11. A method according to claim 10, wherein data is only transmitted from a first device to a second device located in its forwarding direction if a scalar forwarding value derived from the status data exceeds a predetermined value.

- 20 12. A method according to claim 10 or 11, wherein the status data includes a measure of the expected lifetime of the device.

13. A method according to claim 10, 11 or 12, wherein each device defines a first node and a second node, the nodes being spaced apart by a distance determined by the
25 amount of data stored in the buffer, the first node being assigned a positive value for an attribute q and the second node being assigned a negative value for the attribute q , equal in magnitude to that assigned to the positive node,

- generating position values for the first and second nodes based on the status data of the device and neighbouring devices,
30 transmitting the position data and attribute values to similar wireless relay devices
transmitting payload data to devices that are in the general direction of the second node.

14. A method according to claim 13, wherein the positions of the first and second
35 nodes are determined by determining the position in which the aggregate value of the

products of the attribute values of each node with each node of one or more neighbouring devices, and an arithmetical function of the distance between them, is a minimum or maximum.

- 5 15. A method according to claim 14, wherein the devices co-operate to define the positions of the nodes so as to minimise the aggregate distances between nodes having opposite signs, and wherein the forwarding direction of each device is defined as the direction from its receive node in which its transmit node lies.
- 10 16. A method according to claim 13, 14 or 15 wherein the devices co-operate to define their forwarding directions such that payload data is transmitted, by means of one or more of the wireless relay devices, to a target sink device defined by a receive node.